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S2	0	S1 AND (SETTLEMENT) (1W) (EQUATION? OR FORMULA?)
S3	15	S1 AND (EQUATION? OR FORMULA?)
S4	15	RD (unique items)

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4/3,K/1 (Item 1 from file: 484)  
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05195216 SUPPLIER NUMBER: 84469882 (USE FORMAT 7 OR 9 FOR FULLTEXT)  
**The severity of contract enforcement in interfirm channel relationships**  
Antia, Kersi D; Frazier, Gary L  
Journal of Marketing (JMK), v65 n4, p67-81, p.15  
Oct 2001  
ISSN: 0022-2429 JOURNAL CODE: JMK  
DOCUMENT TYPE: Feature  
LANGUAGE: English RECORD TYPE: Fulltext; Abstract  
WORD COUNT: 10232

TEXT:

... H3: The greater the principal's TSIs, the stronger is the positive relationship between environmental **volatility** and **contract** enforcement. Obligation criticality is the importance attached by the principal to the contractual obligation violated...or for H3, which focuses on the moderator effect of TSIs on the connection between **volatility** and **contract** enforcement (b = -.02). H4 is strongly supported (b = .43, p < .01), indicating that when a...Journal of Marketing, 58 (October), 1-16. Bagozzi, Richard (1988), "On the Evaluation of Structural **Equation** Models," Journal of the Academy of Marketing Science, 16 (Spring), 74-95. Ben-Porath, Yoram...  
...John Wiley & Sons.  
Bollen, Kenneth and Richard Lennox (1991), "Conventional Wisdom on Measurement: A Structural **Equation** Perspective," Psychological Bulletin, 110 (September), 305-14.  
Brass, Daniel and Marlene Burkhardt (1993), "Potential Power...Fall), 68-79.  
Freidrich, R.J. (1982), "In Defense of Multiplicative Terms in Multiple Regression **Equations**," American Journal of Political Science, 26 (November), 797-833.  
Friedkin, Noah (1984), "Structural Cohesion and...

4/3,K/2 (Item 2 from file: 484)  
DIALOG(R)File 484:Periodical Abs Plustext  
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03845613 (USE FORMAT 7 OR 9 FOR FULLTEXT)  
**Comment on Alligators in the swamp: The impact of derivatives on the financial performance of depository institutions**  
Saunders, Anthony  
Journal of Money, Credit & Banking (JMB), v28 n3 (Part 2), p498-501  
Aug 1996

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ISSN: 0022-2879 JOURNAL CODE: JMB  
DOCUMENT TYPE: Commentary  
LANGUAGE: English RECORD TYPE: Fulltext; Abstract  
WORD COUNT: 1206 LENGTH: Long (31+ col inches)

TEXT:

... book ratios, liquidity ratios etc.) the authors find a negative relationship between S&Ls' equity **volatility** and **swap** activity, CD rates and swap activity, and a positive relationship between mortgage asset growth and...

...appears to be common in many papers of this type. However, I was concerned about **equation** (6) which wants to test the link between the risk premium of CDs and derivative...

**4/3,K/3 (Item 3 from file: 484)**

DIALOG(R)File 484:Periodical Abs Plustext  
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01918495 (USE FORMAT 7 OR 9 FOR FULLTEXT)

**Determinants of long-term orientation in buyer-seller relationships**

Ganesan, Shankar

Journal of Marketing (JMK), v58 n2, p1-19, p.19

Apr 1994

ISSN: 0022-2429 JOURNAL CODE: JMK

DOCUMENT TYPE: Feature

LANGUAGE: English

RECORD TYPE: Fulltext; Abstract

WORD COUNT: 13350

LENGTH: Long (31+ col inches)

TEXT:

... and future outcomes in specific markets (Klein, Frazier, and Roth 1990). Under conditions of high **volatility**, writing **contracts** that cover all unanticipated contingencies is difficult and costly. In such circumstances, vendors can take...

...firm facing such a wide variety of market segments would have difficulty obtaining information and **formulating** effective strategic programs for each element of the market. Such diversity within a market will...Channels of Distribution," Journal of Marketing, 48 (Summer), 9-29.

Hayduk, Leslie A. (1987), **Structural Equation** Modeling with LISREL: Essential and Advances. Baltimore: Johns Hopkins University Press.

Heide, Jan B. and...

**4/3,K/4 (Item 1 from file: 485)**

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\*\* FULL-TEXT AVAILABLE IN FORMATS 7 AND 9 \*\*

00939749 SUPPLIER NUMBER: 331226311

**In flux - II Magazine Platinum**

Knox, Lewis

Institutional Investor PP: 115-116 Mar 1 2003

ISSN: 0020-3580 JRNL CODE: IL

WORD COUNT: 1505 LINE COUNT: 137

Accounting & Tax DB 1971-2004/Apr W3

...TEXT: for volatility built into an options price, which can be calculated using an options pricing **formula** such as Black-Scholes.)

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When implied volatilities shot up during the late July 2002 stock...

...that they needed an easier, more reliable way to trade volatility. They began by trading **volatility swaps**, but in just a few years, the variance swap outstripped the older instrument.

"Variance swaps are more popular than **volatility swaps** because dealers are able to hedge variance swaps with a high degree of precision and...

4/3,K/5 (Item 2 from file: 485)

DIALOG(R)File 485:Accounting & Tax DB

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\*\* FULL-TEXT AVAILABLE IN FORMATS 7 AND 9 \*\*

00777657 SUPPLIER NUMBER: 57955303

**Estimating and pricing credit risk: An overview**

Kao, Duen-Li

Financial Analysts Journal v56 n4 PP: 50-66 Jul/Aug 2000

ISSN: 0015-198X JRNL CODE: FIA

WORD COUNT: 9123 LINE COUNT: 829

Accounting & Tax DB 1971-2004/Apr W3

...TEXT: have positive relationships with changes in the Treasury curve slope, interest rate option volatility (3m- Vol ), and **swap** spreads. They are negatively correlated with changes in LIBOR, interest rate levels, and equity returns...Ederington 1985; Rodriguez 1988; Kau, Keenan, Muller, and Epperson 1986). The simple relationship presented in **Equations 1 and 2** serves as a useful foundation for the complex risk-pricing models developed ...

...and bond markets. For example, following the relationship of credit risk and spread depicted in **Equation 2**, one can simply estimate default probabilities by assuming a recovery rate and a credit...the model applies default and recovery estimates to the risk-neutrality relationship as stated in **Equation 1**. (Note ...market price/spread information or a credit rating.) Obviously, the discounted risk-free rate in **Equation 1** can be relaxed to be stochastic via a standard interest rate process. Kao (1996...

4/3,K/6 (Item 1 from file: 553)

DIALOG(R)File 553:Wilson Bus. Abs. FullText

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04067374 H.W. WILSON RECORD NUMBER: BWBA99067374 (USE FORMAT 7 FOR FULLTEXT)

**A guide to volatility and variance swaps.**

Demeterfi, Kresimir

Derman, Emanuel; Kamal, Michael

Journal of Derivatives v. 6 no4 (Summer 1999) p. 9-32

LANGUAGE: English

WORD COUNT: 13193

(USE FORMAT 7 FOR FULLTEXT)

ABSTRACT: The properties and the theory of both variance and **volatility swaps**, which are instruments that provide an easy way for investors to gain exposure to the...

...fair value of the variance swap is the cost of the replicating portfolio. An analytical **formula** for theoretical fair value in the presence of realistic volatility skews is devised and tested.

TEXT:

**Volatility swaps** are forward contracts on future realized stock **volatility**. Variance **swaps** are similar contracts on variance, the square of future volatility. Both these instruments provide an...

...businesses.

In this report we explain the properties and the theory of both variance and **volatility swaps**, first from an intuitive point of view and then more rigorously. The theory of variance...

...of the variance swap is the cost of the replicating portfolio.

We derive an analytic **formula** for theoretical fair value in the presence of realistic volatility skews. This **formula** can be used to estimate swap values quickly as the skew changes.

We then examine...

...necessary strikes are unavailable, or when stock prices undergo jumps. Finally, we point out that **volatility swaps** can be replicated by dynamically trading the more straightforward variance swap. As a result, the value of the **volatility swap** depends on the volatility of volatility itself.

Astock's volatility is the simplest measure of...

...where the subscript R denotes the observed or "realized" volatility. This note is concerned with **volatility swaps** and other instruments suitable for trading volatility.

Why trade volatility? Just as stock investors think...

...Nevertheless, imperfect as they are, until recently options were the only volatility vehicle available.

## I. VOLATILITY SWAPS

The easy way to trade volatility is to use **volatility swaps**, sometimes called realized **volatility** forward **contracts**, because they provide pure exposure to volatility (and only to volatility).(FN1)

A stock **volatility swap** is a forward contract on annualized volatility. Its payoff at expiration is equal to

N...

...notional amount of the swap in dollars per annualized volatility point.

The holder of a **volatility swap** at expiration receives N dollars for every point by which the stock's realized volatility...

...after large downward moves in the market. Given these tendencies, there are several uses for **volatility swaps**.

Directional Trading of Volatility Levels. Clients who want to speculate on the future levels of...

...and Implied Volatility Levels. As we show later, the fair delivery price Kvol of a **volatility swap** is a value close to the level ...on the theory and properties of variance swaps, which provide similar volatility exposure to straight **volatility swaps**. Because of its fundamental role, variance can serve as the basic building block for constructing...

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...option of strike  $K$  and expiration  $T$ , whose value is given by the Black-Scholes **formula**  $CBS(S, K, s[\text{square root}]t)$ , where  $S$  is the current stock price,  $s...$

...to the time sensitivity or time decay of the option, because, in the Black-Scholes **formula** with zero interest rate, options values depend on the total variance  $s^2t$ .

If you want...portfolio will provide an additional contribution to  $V$  proportional to that strike. This follows from **Equation** (3), and you can observe it in the increasing height of the  $V$ -peaks in...

... $S^* - \log(S / S^*) + t / T s^2$  (9) The first term in the payoff in **Equation** (9),  $(S - S^*)/S^*$ , describes  $1/S^*$  forward contracts on the stock with delivery price...

...on the position, hedged to expiration, will be

$$\text{Payoff} = (s^2R - s^2I) \quad (10)$$

Looking back at **Equation** (2), you will see that by rehedging the position in log contracts, you have, in...

...of options whose variance vega is independent of the stock price  $S$  is given by **Equation** (9). Only the  $\log()$  term in **Equation** (9) needs continual dynamic rehedging. Therefore, let us concentrate on the log contract term alone the portfolio in **Equation** (11) is

$$V = (T - t / T) \quad (12)$$

The exposure to variance is equal to 1...

...is a smoother function of  $S$  than the sharply peaked gamma of a single option.

**Equations** (13) and (14) can be combined to show that

$$j + 1 / 2 GS^2s^2 = 0 \quad (15)$$

**Equation** (15) is the essence of the Black-Scholes option pricing theory. It states that the...

...the contract has zero present value:

$$Kvar = E V \quad (19)$$

If the future volatility in **Equation** (16) is specified, then one approach for calculating the fair price of variance is to...variance along each simulated path consistent with the risk-neutral stock price evolution given in **Equation** (16), where the drift  $m$  is set equal to the riskless rate.

This approach is...

...to  $\log St$ , we find

$$d(\log St) = (m - 1 / 2s^2)dt + sdZt \quad (21)$$

Subtracting **Equation** (21) from **Equation** (16), we obtain

$$dSt / St - d(\log St) = 1 / 2s^2dt \quad (22)$$

in which all dependence on the drift  $m$  has canceled. Integrating **Equation** (22) over all times from 0 to  $T$ , we obtain the continuously sampled variance

$V...$

...inception to expiration at time  $T$ .

Note that no expectations or averages have been taken. **Equation** (23) guarantees that variance can be captured no matter which path the stock price takes, as long as it moves continuously.

**Equation** (23) provides another method for calculating the fair variance. Instead of averaging over future variances, as in **Equation** (20), one can take the expected risk-neutral value of the right-hand side of **Equation** (23) to obtain the cost of replication directly, so that

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$$Kvar = 2 / T E [\text{integral}]_0^T dSt / St - \log ST / S0 \quad (24)$$

The expected value of the first term in **Equation** (24) accounts for the cost of rebalancing. In a risk-neutral world with a constant...

...of the hedging strategy is given by

$$E [\text{integral}]_0^T dSt / St = rT \quad (26)$$

This **equation** represents the fact that a share position, continuously rebalanced to be worth \$1, has a...

...riskless rate.

As there are no actively traded log contracts for the second term in **Equation** (24), one must duplicate the log payoff, at all stock price levels at expiration, by...

...dK + (put options)

$$[\text{integral}]_{-\infty}^{\infty} S^* 1 / K2 \max(ST - K, 0) dK \quad (\text{call options}) \quad (28)$$

**Equation** (28) represents the decomposition of a log payoff into a portfolio consisting of:

\* A short...

...related to the initial fair value of each term on the right-hand side of **Equation** (24). By using the identities in **Equations** (26) and (28), we obtain

$$Kvar = 2 / T(rT - (S0 / S^*(e^{rT}) - 1) - \log(S...$$

...from a theoretical point of view, and makes fewer assumptions than our initial intuitive treatment. **Equation** (29) makes precise the intuitive notion that implied volatilities can be regarded as the market...

...realized volatility, even when there is an implied volatility skew, and the simple Black-Scholes **formula** is invalid.

### V. EXAMPLE OF A VARIANCE SWAP

Suppose you want to price ...options of all strikes between zero and infinity, the fair variance would be given by **Equation** (29) with some choice of  $S^*$ , say,  $S^* = S0$ . In practice, however, only a small set of discrete option strikes are available, and using **Equation** (29) with only a few strikes leads to appreciable errors. Here we suggest a better approximation.

We start with the definition of fair variance given by **Equation** (24), which can be written as

$$Kvar [\text{triple bond}] 2 / T E [\text{integral}]_0^T dSt...$$

...strikes  $Kip$  such that  $K0 = S^* > Kp > K2p > K3p > \dots$ . In Appendix A we derive the **formula** that determines how many options of each strike you need in order to approximate the...

...little to the total cost.

The cost of capturing variance is now simply calculated using **Equation** (30) with the result  $Kvar = (20.467)(FN2)$ . This is not strictly the fair variance...

...simple, yet realistic form. We compare the numerically correct value of fair variance, computed from **Equation** (29), with an approximate analytic **formula** that we derive. This **formula** provides a good rule of thumb for a quick estimate of the impact of the...

...exposure of a put option, given by  $p = -N(-d1)$ , where  $d1$  is defined in **Equation** (4),  $S0$  is the implied volatility of a "50-delta" put option, and  $b$  is...

...ten volatility points.

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Note that there is an implicit dependence on time to expiration in **Equation (33)**, because of the  $p$  term. Since  $p$  is bounded, the implied volatility is always positive, provided  $b < 2S_0$ . For unrealistically large skews, the parameterization in **Equation (33)** leads to arbitrage violation, anyway.

It is useful to see how this parameterization of the skew looks as a function of strike. The skew by delta in **Equation (33)** and the same skew as a function of strike are displayed in Exhibit 7.

Appendix B presents a detailed derivation of an approximate **formula** for the fair variance of the contract with time to expiration  $T$ :

$Kvar \ S20(1...$

...the results for fair variance, computed numerically, with the approximate values given by the analytic **formula** in **Equation (34)**. The analytic **formula** works very well for the three-month variance swap, and truly impressively for the one...that are polynomials in delta or in strike. Demeterfi et al. 1999 explicitly derive a **formula** analogous to **Equation (34)** for the skew linear in strike.

### VII. PRACTICAL PROBLEMS WITH REPLICATION

**Equation (23)** shows that a variance swap is theoretically equivalent to a dynamically adjusted, constant-dollar...

...the strikes are uniformly spaced, one point apart. (The fair variance is calculated according to **Equation (29)**, except that the integrals are replaced by sums over the available option strikes whose...

...at the right rate. Second, even with perfect replication, a discontinuous stock price jump causes **Equation (23)** to capture an amount not equal to the true realized variance.

In reality, both...The impact of the jump on the quantity captured by our variance replication strategy in **Equation (37)** is

$$2 / T (S_i / S_{i-1} - \log S_i / S_{i-1})_{\text{jump}} = 2 / T - J...$$

...be regarded as part of a continuous stock evolution process, the right-hand side of **Equation (40)** does reduce to the contribution of this (now small) move to the true realized...

...on the strategy for a range of jump values. Note that the cubic approximation of **Equation (43)** correctly predicts the sign of the P&L for all values of the jump...

...of \$1 per squared variance point, which is hedged with the variance replication strategy of **Equation (37)** for  $T = 1$  year.

### THE EFFECT OF JUMPS WHEN REPLICATING WITH A FINITE STRIKE VIII. FROM VARIANCE TO VOLATILITY CONTRACTS

There is no simple replication strategy for synthesizing a **volatility swap**; it is variance that emerges naturally from hedged options trading. The replication strategy for the...

...the total variance over the life of the log contract.

The replication strategy for a **volatility swap** is fundamentally different; it is affected by changes in volatility, and its value depends on...

...point of view, variance is the primary underlier, and all other volatility payoffs, such as **volatility swaps**, are best regarded as

derivative securities on the variance as underlier.

From this perspective, volatility...

...and hedge.

To illustrate the issues involved, let's consider a naive strategy. Approximate a **volatility swap** by statically holding a suitably chosen variance contract. In order to approximate a **volatility swap** struck at Kvol, which has payoff  $sR - Kvol$ , we can use the approximation

$sR - Kvol \dots$

...K2vol) (44)

This means that  $1/(2Kvol)$  variance contracts with strike K2vol can approximate a **volatility swap** with a notional \$1/(vol point), for realized volatilities near Kvol. With this choice, the...

...would also imply that the fair price of future volatility (the strike for which the **volatility swap** has zero value) is simply the square root of fair variance Kvar:

$Kvol = [\text{square root}]Kvar$  (naive estimate) (45)

In Exhibit 14 we compare the two sides of **Equation** (44) for  $Kvol = 30[\text{percent}]$  for different values of the realized volatility. The actual **volatility swap** and the approximating variance swap differ appreciably only when the future realized volatility moves away from Kvol; you cannot fit a line everywhere with a parabola.

The naive estimate of **Equations** (44) and (45) is not quite correct. With this choice, the variance swap payoff is always greater than the **volatility swap** payoff. The mismatch between the variance and **volatility swap** payoffs in **Equation** (44) is the

$\text{Convexity bias} = 1 / 2Kvol(sR - Kvol)^2$

This square is always positive...

...this choice of the fair delivery price for volatility, the variance swap always outperforms the **volatility swap**. To avoid this arbitrage, we should correct our naive estimate to make the fair strike for the **volatility contract** lower than the square root of the fair strike for a variance contract, so that...

...to estimate the size of the convexity bias, and therefore the fair strike for the **volatility swap**, it is necessary to make an assumption about both the level and the volatility of...

...normally distributed.

In principle, some of the risks inherent in the static approximation of a **volatility swap** by a variance swap could be reduced by dynamically trading new variance contracts throughout the life of the **volatility swap**. This dynamic replication of a **volatility swap** by means of variance swaps would (in principle) produce the payoff of a **volatility swap** independent of the moves in future volatility.

This is closely analogous to replicating a curved...

...ratio depends on the assumed future volatility of the stock, the dynamic replication of a **volatility swap** requires a model for the volatility of volatility. Taking the analogy further, one could imagine...

...there is a liquid market in variance swaps, these models may be useful in hedging **volatility swaps** and other variance derivatives.

#### IX. CONCLUSIONS AND FUTURE INNOVATIONS

We have tried to present a...

...analytic approximations that work well for the swap value under commonly used skew parameterizations. These **formulas** enable traders to update

price quotes quickly as the market skew changes.

There are at...

...two areas where further development is warranted. First, our ability to effectively price and hedge **volatility swaps** is still limited. To fully implement a replication strategy for **volatility swaps**, we need a consistent stochastic volatility model for options. Much work remains to be done in this area.

Second, some market participants prefer to enter a capped variance swap or **volatility swap** that limits the possible loss on the position. The capped variance swap has embedded in it an option on realized variance. The development of a truly liquid market in **volatility swaps**, forwards, or futures would lead to the possibility ...Richard Sussman, and Nicholas Warren, and several clients, for many discussions and insightful questions about **volatility swaps**; and Barbara Dunn for editorial assistance.

EXHIBIT 5 Portfolio of European-Style Put and Call...

...Total Cost

419.8671

EXHIBIT 8 Comparison of Fair Variance Computed Numerically with Approximate Analytic Formula

EXHIBIT 10 Effect of Strike Range on Estimated

	Wide Strike Range	Narrow Strike Range
Expiration...		

...function of strike.

EXHIBIT 9 Comparison of Exact Value of Fair Variance with Approximate Analytic Formula as Function of Skew Slope b The thin line with squares shows the exact values obtained by replicating the log payoff. The thick line depicts the approximate value given by Equation (34). (a) Three-month variance swap. (b) One-year variance swap.

EXHIBIT 11 Comparison of...

...Swap and a Long Position in the Variance Replication Strategy

EXHIBIT 14 Payoff of a **Volatility Swap** (straight line) and Variance Swap (curved line) as a Function of Realized Volatility

EXHIBIT 15...Derman, M. Kamal, and J.Z. Zou. "More Than You Ever Wanted to Know About **Volatility Swaps**." Goldman, Sachs & Co., March 1999.

Derman, E., M. Kamal, I. Kani, J. McClure, C. Pirasteh...

...0, which implies that

$$2r + K [\text{differential}]r / [\text{differential}]K = 0$$

The solution to this equation is

$$r = \text{const} / K^2 \quad (\text{A-3})$$

LOG PAYOFF REPLICATION WITH A DISCRETE SET OF OPTIONS...

...wp(Ki,p) (A-8)

#### APPENDIX B SKEW LINEAR IN DELTA

Here, we derive a formula that gives the approximate value of the variance swap when implied volatility varies linearly with...the fair variance in the "flat world" where volatility is constant and is given by Equation (B-2) with S(b) replaced by S0.

The derivatives that enter Equation (B-4) are given by:

$$[\text{differential}]P / [\text{differential}]b[\text{single bond}]b=0 = [\text{differential}]P...$$

...B-5)

The derivatives with respect to volatility are easily calculated using the Black-Scholes formula :

$$\frac{[\text{differential}]P}{[\text{differential}]S[\text{single bond}]S_0} = \frac{[\text{differential}]C}{[\text{differential}]S[\text{single bond}]S_0} = S \dots$$

...differences with the previous detailed calculations. We start with the same fundamental expression as in Equation (B-2):

$$Kvar = 2 / T(rT - (S_0 / S^*e^{rT} - 1) - \log S^* / S_0 + e^{rT} [\text{integral}]S \dots$$

Then we use different implied volatility parameterizations for put and call options, as given by Equation (B-11). Note that we should choose  $S^*$  so that

$$S^* = SFe^{-S_0T/2}$$

This ensures that we use the put (call) parameterization in Equation (B-11) for strikes below (above)  $S^*$ . We expand put option prices in powers of...

...12)

Obviously, for  $b_p = b_c$ , this reduces to the result for single slope given in Equation (B-10). Note that by changing the sign of  $b_c$  we turn the implied skew into a smile.

#### APPENDIX C STATIC AND DYNAMIC REPLICATION OF A VOLATILITY SWAP

We have argued that volatility swaps are fundamentally different from variance swaps and that, unlike the variance swap, there is no simple replicating strategy to create a volatility swap synthetically. We show that attempting to create a volatility swap from a variance swap by means of a buy-and-hold strategy invariably leads to...

...the strike and notional size of a variance contract to match the payoff of a volatility contract, on average, as closely as possible. The extent of the replication mismatch will depend on...

...choose  $a$  and  $b$  to minimize the expected squared deviation of the two sides of Equation (C-1):

$$\min E (ST - aS_2T - b)^2 \quad (C-2)$$

Differentiation leads to two equations for the coefficients  $a$  and  $b$ :

$$E ST = aE S_2T + b$$

$$E S_3T = aE S_4T \dots$$

...ST)  $1 - \text{corr}(ST, S_2T)^2$  (C-5)

For realized volatilities distributed normally as in Equation (C-4), the hedging coefficients are

$$a = 1 / 2S + s_2S / S$$

$$b = S / 2 + s_2S \dots$$

4/3,K/7 (Item 2 from file: 553)

DIALOG(R)File 553:Wilson Bus. Abs. FullText

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04066587 H.W. WILSON RECORD NUMBER: BWBA99066587 (USE FORMAT 7 FOR FULLTEXT)

Value at risk for derivatives.

El-Jahel, Lina

Perraudin, William; Sellin, Peter

Journal of Derivatives v. 6 no3 (Spring 1999) p. 7-26

LANGUAGE: English

WORD COUNT: 8912

(USE FORMAT 7 FOR FULLTEXT)

TEXT:

...  $ht \quad St / ht \quad [differential]h(St, t) / [differential]S \quad St+ - St / St$   
(2)

Starting from **Equation** (2), the delta method consists of supposing that:

$ht+ - ht / ht \approx N(0, s2...$

... $[differential]h(St, t) / [differential]S \quad St / h(St, t) \quad s$  (3).

The variance in **Equation** (3) is, of course, the square of the instantaneous volatility of  $ht$  obtained by applying...

...the corresponding changes in the value of a European call using the usual Black-Scholes **formula**. We take the VaR to be the loss on a portfolio consisting of one unit...

...volatility substitutes to some degree for being in the money, in that VaRs for low- **volatility contracts** are again substantially biased.

The simple intuitive explanation for the bias may be appreciated by...

...the log security price,  $xt$  [triple bond]  $\log(St)$ , and then use a Fourier inversion **formula** to obtain the conditional density of  $xT$ , given observations of  $xt$  and  $vt$  for  $t...$

...I invested in a call, assuming that  $St$  and  $vt$  follow the processes given in **Equations** (4) and (5).

For the baseline volatility case with different maturities shown in Exhibit 3...vector process reasonably easily. The characteristic function may be obtained by solving a partial differential **equation**. Only when the correlation structure follows these assumptions is it reasonably straightforward to modify Heston's approach and solve the corresponding partial differential **equation**.

It is worth emphasizing that ... $N$ -vectors of dummy variables, and  $i = [\text{square root}] - 1$ . Note that  $f$  defined in **Equation** (13) is the joint characteristic function of  $xT$  and  $vT$ , and hence differs from the characteristic function of  $xT$  alone employed in the call pricing and defined after **Equation** (6).

Since  $f$  is a conditional expectation, it is a martingale and has a zero drift. Applying Ito's lemma and setting the drift term to zero yields:

{ **Formula** omitted}

subject to the boundary condition:

$f(x, v, T; f) = \exp \{ \int_0^T x + \int_0^T v v \}$  (15)

As we show in Appendix A, solving the partial differential **Equation** (14) subject to the boundary condition in (15), one obtains a proposition as follows.

PROPOSITION...are quite similar.

Densities from the Pearson family are solutions,  $W(z)$ , to the differential **equation**:

$dW(z) / dz = (z - b)W(z) / (b_0 + b_1z + b_2z^2)$  (29)

for constant parameters,  $b...$

...are consistently lower than the exact Monte Carlo VaR based on the true option pricing **formula**. This reflects the fact that the third derivative of the option price is positive in...covariance parameters for a vector of security price processes whose elements resemble the process in **Equation** (4).

7 If the true call price were really a quadratic function of the underlying...

...T.C. "Plugging the Gap." Risk, 7 (1994), pp. 74-80.

APPENDIX A SOLUTION OF EQUATION (14)

To solve Equation (14), guess a solution of the form:

$$f(x, v, t; f) = \exp C(t \dots$$

...DN(t) ' is an N X 1 valued function.

Taking derivatives, substituting in the differential equation and cancelling terms yields:

{ Formula omitted}

Equating coefficients on like terms (i.e., on constants and v1, v2, ..., vN) yields a system of equations :

$$-1/2\{\text{Graphic character omitted}\}\{\text{Graphic character omitted}\}fxjfxksjnkn + \{\text{Graphic character omitted}\}ifxjsnjHnrnDn(t) + 1...Dn / [\text{differential}]t + a2na0nDn = 0 \quad (A-9)$$

Let l1n, l2n be the roots of the equation

$$l2 + aln1 + a2na0n = 0 \quad (A-10)$$

The general solution of the equation is then:

$$Dn(t) = A1n \exp -l1n(T - t) + A2n \exp -l2n(T - t) \quad (A...$$

...and assuming A1n [not equal] 0 to obtain the solution for Dn(t) given in Equation (17). The boundary condition Dn(T) = ifvn then implies that An is given as in Equation (19). Integrating the differential equation in C(t) yields the expression for Cn(t) that appears in Equation (18). Note that here we have imposed the boundary condition C(T) = 0 to determine...

...structure permits a very simple recursive estimation strategy. The model may be discretized to yield:

{ Formula omitted}

{ Formula omitted}

The unconditional variance of eS equals

$$\text{Var } eS = \text{SGS}'$$

where

$$\text{Var } [\text{square root}]vW...$$

4/3,K/8 (Item 3 from file: 553)

DIALOG(R)File 553:Wilson Bus. Abs. FullText  
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03839192 H.W. WILSON RECORD NUMBER: BWBA98089192 (USE FORMAT 7 FOR FULLTEXT)

**Mini markets, big potential.**

AUGMENTED TITLE: smaller accounts

Holter, James T

Futures (Cedar Falls, Iowa) (Futures (Cedar Falls)) v. 27 no8 (Aug. '98) p. 64-6

LANGUAGE: English

WORD COUNT: 2035

(USE FORMAT 7 FOR FULLTEXT)

TEXT:

... of Hendersonville, N.C.-based Futures Truth Co. "I've looked at a bunch of formulas , and they really don't do a better job of measuring liquidity than volume or...

Search Report from Ginger R. DeMille

...from a volatility concern. For this reason, you definitely want less volatile contracts."

Some low- **volatility contracts** are MidAm corn and soybeans, CME live cattle, CME Eurodollars and the Canadian dollar, CSCE...  
...York Mercantile Exchange (Nymex) crude oil (relative to other energies) and MGE spring wheat. High **volatility contracts** small traders should avoid are the CME's Russian ruble and the full-sized S...

**4/3,K/9 (Item 4 from file: 553)**

DIALOG(R)File 553:Wilson Bus. Abs. FullText  
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03532485 H.W. WILSON RECORD NUMBER: BWBA97032485 (USE FORMAT 7 FOR FULLTEXT)

**Leveling the playing field.**

AUGMENTED TITLE: trading multiple markets

Etzkorn, Mark

Futures (Cedar Falls, Iowa) (Futures (Cedar Falls)) v. 26 (Mar. '97) p. 42-4

LANGUAGE: English

WORD COUNT: 1754

(USE FORMAT 7 FOR FULLTEXT)

TEXT:

... S&P contract, it is highly unlikely a corresponding winning phase in the smaller, lower **volatility corn contract** would have any significant impact on the drawdown. However, you can offset this apples-to...trade risk was set at 5[percent] of a \$25,000 account per trade. The **formula** for determining the number of contracts to trade was: \$1,250/ATR (in dollars). While...

**4/3,K/10 (Item 5 from file: 553)**

DIALOG(R)File 553:Wilson Bus. Abs. FullText  
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03340100 H.W. WILSON RECORD NUMBER: BWBA96090100 (USE FORMAT 7 FOR FULLTEXT)

**Feeding frenzy: global appetite pushes grain prices higher.**

Kharouf, Jim

Futures (Cedar Falls, Iowa) (Futures (Cedar Falls)) v. 25 (Nov. '96) p. 30-2+

LANGUAGE: English

WORD COUNT: 2560

(USE FORMAT 7 FOR FULLTEXT)

TEXT:

... competing for acreage."

Many analysts are looking at China as the wild card in the **equation** for all three grains. With soybeans, the country has moved in the last several years...check: Corn 1996 vs. 1995

Higher prices and low carryovers in corn led to more **volatility** and **contracts** traded in 1996. Wheat and soybeans showed similar volume gains.

TECH TALK: CORN

Bill Arndt...

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4/3,K/11 (Item 6 from file: 553)

DIALOG(R)File 553:Wilson Bus. Abs. FullText  
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03327104 H.W. WILSON RECORD NUMBER: BWBA96077104 (USE FORMAT 7 FOR FULLTEXT)

**Nobody's perfect.**

AUGMENTED TITLE: series on system design and testing; part 9

Etzkorn, Mark

Futures (Cedar Falls, Iowa) (Futures (Cedar Falls)) v. 25 (Sept. '96) p. 54-6+

LANGUAGE: English

WORD COUNT: 3144

(USE FORMAT 7 FOR FULLTEXT)

TEXT:

... of Trendstat Capital Management Inc., a CTA located in Scottsdale, Ariz.; Nelson Freeburg, editor of **Formula** Research in Memphis, Tenn., a noted system design and evaluation newsletter, and Louis Lukac, partner... balance your overall risk profile. The goal, Lukac says, is essentially to equalize the relative **volatility** between **contracts**. One way to approach it is to balance the dollar value of the margins in...

...our trading efforts. We'll also consider the most unpredictable variable in the system-trading **equation**: the trader.

Added material

Dynamic breakout system (DBS) as of 7-26-96 Trade size...

4/3,K/12 (Item 1 from file: 636)

DIALOG(R)File 636:Gale Group Newsletter DB(TM)  
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05547659 Supplier Number: 99851835 (USE FORMAT 7 FOR FULLTEXT)

**A primer on using the inflation market. (Learning Curve).**

Hove, Xavier Van

Derivatives Week, v12, n14, p8(2)

April 7, 2003

Language: English Record Type: Fulltext

Document Type: Newsletter; Trade

Word Count: 1527

... S. Treasuries or TIPS returns

\* Equity volatility (much greater than) U.S. Treasury volatility >  
TIPS **volatility**

Inflation **Swaps**

Inflation investing and hedging is facilitated by the development of an inflation swap market. ...and sector risk. For example, recently, the most popular notes have had the following coupon **formula**:

$$(C_{sub.i}) = ((I_{sub.i}) / (...)$$

4/3,K/13 (Item 2 from file: 636)

DIALOG(R)File 636:Gale Group Newsletter DB(TM)  
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05198834 Supplier Number: 82878498 (USE FORMAT 7 FOR FULLTEXT)

Search Report from Ginger R. DeMille

**Single stock variance swaps. (Learning Curve(R)).**

Derivatives Week, v11, n6, p8(2)

Feb 11, 2002

Language: English Record Type: Fulltext

Document Type: Newsletter; Trade

Word Count: 891

(USE FORMAT 7 FOR FULLTEXT)

TEXT:

...adjusted through the life of the option. While the BlackScholes framework provides a straight forward **formula** with regard to initiating (delta) and adjusting (gamma) the stock hedge, the process of realizing...  
... variance swap is a new product that provides direct long or short access to realized **volatility** . The **swap** may be a useful alternative for traders who are currently using delta-neutral option strategies...

**4/3,K/14 (Item 3 from file: 636)**

DIALOG(R)File 636:Gale Group Newsletter DB(TM)

(c) 2004 The Gale Group. All rts. reserv.

04839732 Supplier Number: 66930613 (USE FORMAT 7 FOR FULLTEXT)

**LEARNING CURVE (R) VARIANCE SWAP VOLATILITY AND OPTION STRATEGIES.**

Derivatives Week, v9, n44, p7

Oct 30, 2000

Language: English Record Type: Fulltext

Document Type: Newsletter; Trade

Word Count: 1257

... variance above  $((\sigma)^{\sup.2})=5.29\%$  (where the variance is computed using the above **formula** ) and A agrees to pay B USD100,000 per variance point below this value. In...contract. This is the definition of the variance swap volatility. We will next derive a **formula** for computing it.

**VARIANCE SWAPS AND LOG-CONTRACTS**

A key observation, separately noted by Neuberger...

$i+1)-(S_{\text{sub}.i})/(S_{\text{sub}.i})^{\sup.2})$

Summing both sides of this **equation** over the total number of days in the contract, and rearranging terms, we obtain

$((\sigma \dots \delta)$  at the close of each trading day, assuming that funding costs are zero.

**A FORMULA FOR THE VSV**

To price the log-contract, we approximate the payoff with a function ...the prices of European puts and calls with strike K expiring in T years. This **formula** can be interpreted as an arbitrage relationship between the implied volatilities of traded options and...example, liquid contracts trading at levels deeply below VSV should be attractive for buyers of **volatility** , while **contracts** trading above the VSV should be viewed as expensive from this perspective.

As a general...

**4/3,K/15 (Item 1 from file: 654)**

DIALOG(R)File 654:US Pat.Full.

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0005480257 \*\*IMAGE Available

Derwent Accession: 2004-089894

**Replicated derivatives having demand-based, adjustable returns, and trading exchange therefor**

Search Report from Ginger R. DeMille

Inventor: Lange, Jeffrey, INV  
Baron, Kenneth, INV  
Walden, Charles, INV  
Harte, Marcus, INV

Correspondence Address: KENYON & KENYON, ONE BROADWAY, NEW YORK, NY, 10004,  
US

	Publication Number	Kind	Date	Application Number	Filing Date
Main Patent	US 20030236738	A1	20031225	US 2003365033	20030211
CIP	PENDING			US 2002115505	20020402
CIP	PENDING			US 2001950498	20010910
CIP	PENDING			US 2001809025	20010316
CIP	US 6627525			US 2001774816	20010131
CIP	US 6321212			US 99448822	19991124
Provisional				US 60-144890	19990721

Fulltext Word Count: 172626

Summary of the Invention:

...the derivatives market which first allowed the well-known Black-Scholes pricing model to be **formulated** by noting that a derivative such as an option could be paired with an exactly...further preferred embodiment, the allocating step includes the step of solving a set of simultaneous **equations** that relate traded amounts to unit payouts and payout distributions; and the calculating step and...

...preferred embodiments, the step of fixed point iteration includes the steps of (a) selecting an **equation** of the set of simultaneous **equations** described above, the **equation** having an independent variable and at least one dependent variable; (b) assigning arbitrary values to each of the dependent variables in the selected **equation**; (c) calculating the value of the independent variable in the selected **equation** responsive to the currently assigned values of each the dependent variables; (d) assigning the calculated value of the independent variable to the independent variable; (e) designating an **equation** of the set of simultaneous **equations** as the selected **equation**; and (f) sequentially performing the calculating the value step, the assigning the calculated value step, and the designating an **equation** step until the value of each of the variables converges...

Description of the Invention:

...mathematical **formula** - see patent image...mathematical **formula** - see patent image...  
mathematical **formula** - see patent image...matrix. CDRF 2 typically involves the use of numerical methods to solve m simultaneous quadratic **equations**. For example, consider a trader who would like to know what amount, [small alpha, Greek...forward" expression to compute payouts from traded amounts as in CDRF above yields the following **equation**:

(...

...mathematical **formula** - see patent image...

...0258] This represents a given row and column of the matrix **equation** CDRF after [small alpha, Greek] has been traded for state i (assuming no transaction fee...

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...mathematical formula - see patent image...mathematical formula - see
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...0379] Asset Class 1 Volatility : 5mathematical formula - see
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formula - see patent image...mathematical formula - see patent image
...mathematical formula - see patent image...mathematical formula - see
patent image...mathematical formula - see patent image...in the trading
period) and (b) a vector containing the trader's desired payouts. The
equation above shows that the amounts to be invested in order to produce
a desired payout...0671] Portfolio managers and market-makers formulate
market views based in part on their forecasts for future movements in
central bank target...

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